

What is claimed is:

1. An opto-electronic device, comprising a substrate, a number of different active-layers , a number of different barrier-layers arranged in a vertical stack, and contact means arranged for extracting and injecting charge carriers to said active-layers, wherein said contact means are selected according to band-alignment and work-function with respect to the energy levels of said active-layers, involved in photon-absorption and photon-emission opto-electronic transitions.
2. A device as claimed in claim 1, wherein the barrier-layers consist of wide band-gap semiconductors or insulators.
3. A device as claimed in claim 1, wherein the active-layers are dimensioned to adjust the quantum well depth, thereby controlling the absorbing and emitting properties for the layers, irrespective of the bulk properties of those films.
4. A device as claimed in claim 1, wherein the contact means are implemented through lateral contacts made separately to each of said active-layer or set of active-layers having the same parameters.
5. A device as claimed in claim 4, wherein said contacts are adapted such that the injection into and extraction from the active-layers is separated for electrons or holes.
6. A device as claimed in claim 4, wherein said contacts are adapted such that electrons or holes are at least one of separately injected into and separately extracted from only the selected energy levels in the active-layers.
7. A device as claimed in claim 1, wherein the contact means implemented through lateral contacts select the type of opto-electronic transitions to take place in the active-layers, by selectively enabling charge carrier transport to only the chosen energy levels in the active-layers.
8. A device as claimed in claim 7, wherein said contacts are formed with Metal-Insulator-Semiconductor (MIS) or Metal-Oxide-Semiconductor (MOS) systems using ultra-thin insulator/oxide films and metals with different work-functions.
9. A device as claimed in claim 6, wherein said contacts are formed with Metal-Insulator-Semiconductor (MIS) or Metal-Oxide-Semiconductor (MOS) systems using ultra-thin insulator/oxide films and metals with different work-functions.
10. A device as claimed in claim 1, wherein all the active-layers are adapted to be Quantum Wells, whereby said active-layers have at least one of an adjustable absorption edge and an adjustable emission edge.
11. A device as claimed in claim 10, wherein all the active-layers are adjusted to be capable of being transparent to visible light.

12. A device as claimed in claim 1, adapted to serve as a wavelength-selective multi-spectral Photo-Detector.
13. A device as claimed in claim 12, adapted for Image-Sensing and Optical Communications.
14. A device as claimed in claim 1, adapted to serve as a wavelength-selective multi-spectral Light-Valve.
15. A device as claimed in claim 1, adapted for Solid-State Reflection Displays and Optical Communications.
16. A device as claimed in claim 1, adapted to serve as a multiple band-gap Solar-Cell.
17. A device as claimed in claim 16, adapted to be embedded with at least one of Photo-Detectors and Light-Valves for Image-Sensing, Optical Communications, and Solid-State Reflection Displays.
18. A device as claimed in claim 1, adapted to serve as a wavelength-selective multi-spectral Light-Emitter.
19. A device as claimed in claim 18, adapted for Optical Communications, and Solid-State Emission Displays.
20. A device as claimed in claim 1, adapted to produce coherent light.
21. A device as claimed in claim 1, wherein the active-layers consist in at least one of silicon, silicon-related alloys, and superlattices.